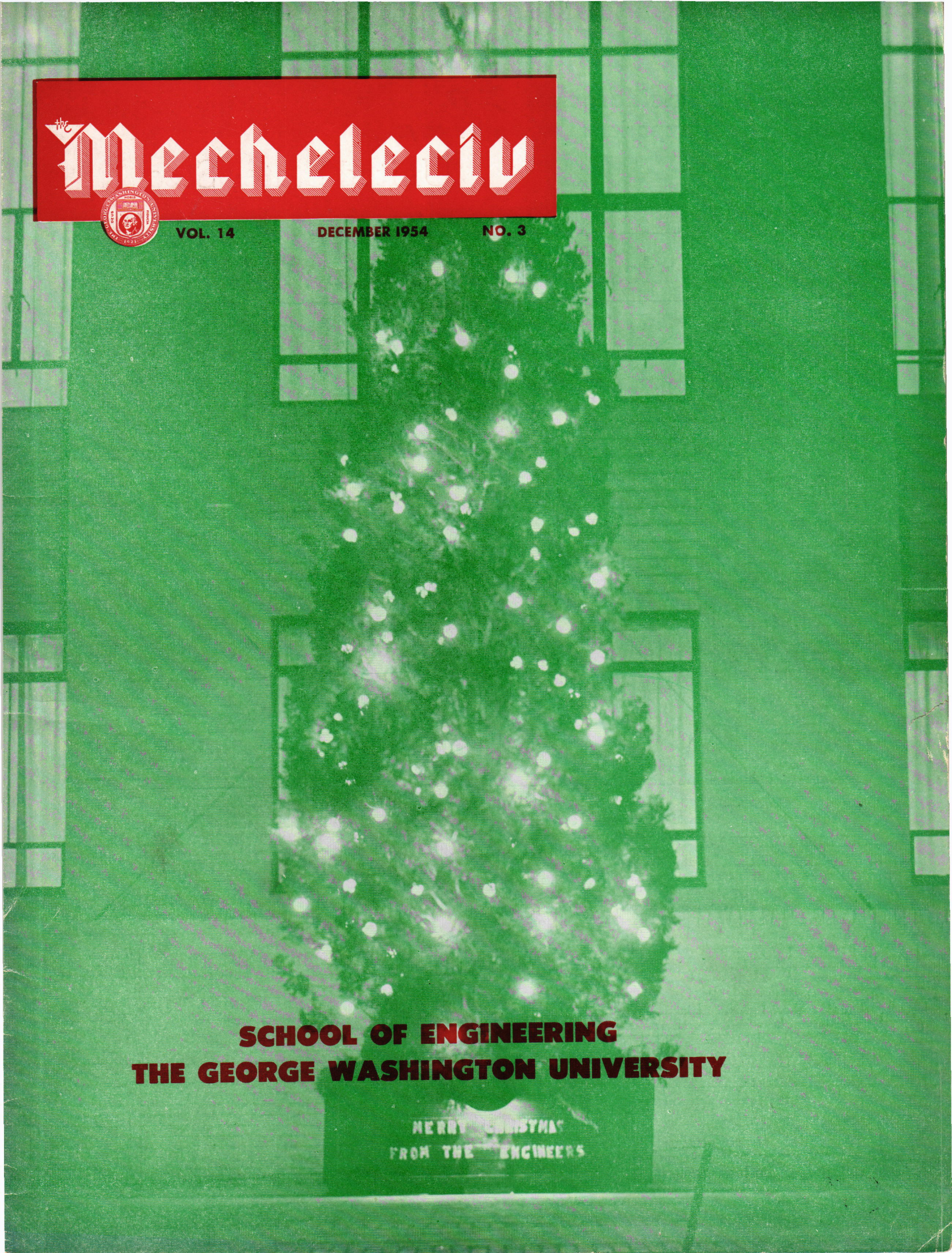
The Mechelectiv

VOL. 14 DECEMBER 1954 NO. 3



SCHOOL OF ENGINEERING
THE GEORGE WASHINGTON UNIVERSITY

Robert L. Schneider, class of '49,
speaks from experience when he says...

"United States Steel offers unlimited opportunities covering practically all engineering fields"

IN 1949 Robert L. Schneider graduated from college with degrees in engineering and physics. After being interviewed by United States Steel, he was accepted as a trainee. Then after a year, he was advanced to a test engineer in the Maintenance Department; then to a power foreman in the Power & Fuel Division. By 1953, he had been made Power Superintendent in the Power & Fuel Division at the Carrie Furnaces.

As superintendent, he is responsible for the operation and maintenance of power producing and distributing facilities for the plant which supplies electrical power to several of our largest steel mills around Pittsburgh. Such advancement is not unusual at U.S. Steel.

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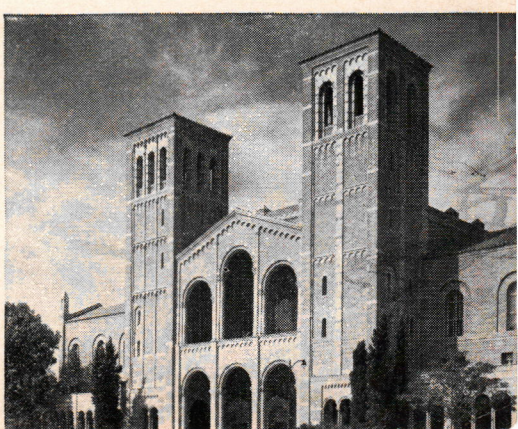

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VOL. 14 DECEMBER 1954 NO. 3

SCHOOL OF ENGINEERING, THE GEORGE WASHINGTON UNIVERSITY

IN THIS ISSUE

ON OUR COVER

Obviously it is a Christmas Tree. More than that, it is the first University Christmas Tree sponsored by the Engineers' Council, Chritsmas 1939. Just our way of saying Merry Christmas!

FRONTISPIECE

A new Boeing B-47E Stratojet equipped with a G.E. designed "Sunday Punch" radar controlled 20-mm tail turret which is capable of tracking and shooting down unseen targets in the night or fog.

—PHOTO COURTESY GENERAL ELECTRIC

Published at the George Washington University by direction of the Engineers' Council. Published six times during the school year in October, November, December, March, April, and May. Entered as second class matter March 6, 1951, at the Post Office at Washington, D. C., under the act of March 3, 1879. Address communications to Mechelectiv Magazine, Student Union Annex, George Washington University, Washington 6, D. C. or telephone NAtional 8-5200, extension 528.

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At Last---
A Vacation !

The holiday season is here at last, and most of us now have the time to do the things that we've been putting off all semester.... Lab reports will finally be written and problems will be worked.... It's great!

The MECHELECIV *staff has been saving some of the better student articles to appear in this issue so that our readers will have more time to enjoy them.*

We have also presented two articles here on the same subject—how to improve the automotive power plant. The first article attacks the problem by changing the type of engine, the second article is written on the use of a different fuel. Work in both of the areas is going on simultaneously, and a look at both of the fields at the same time will prove to be interesting.

This semester will be over before we realize, and this means that it is again time to begin thinking about the Engineers' Mixer.

This affair was not held in the fall of this year because of difficulty in getting a hall for it. It was postponed then until the spring semester.

It is really up to the students now if they want to have the Mixer, because the Engineers' Council, being your representatives, will do as the students suggest. Every student should make his ideas on the Mixer known to his Council delegate.

Beginning in February, the Societies will hold their annual student paper competitions. Every student who can should plan on participating this year for the experience, the honor, and the prizes (if he should win).

Now is the time, over the holidays, to begin preparation of your paper. You should begin by contacting your society chairman for the complete rules. We have also included in this issue one of the A. S. C. E. prize-winning articles from last year to give you an idea of what they are like.

The best of luck to all of our student readers on their papers, and a Merry Christmas and a very successful New Year to all of you.

Meet the Automotive

By C. Kingsley Brown, B.M.E. '55

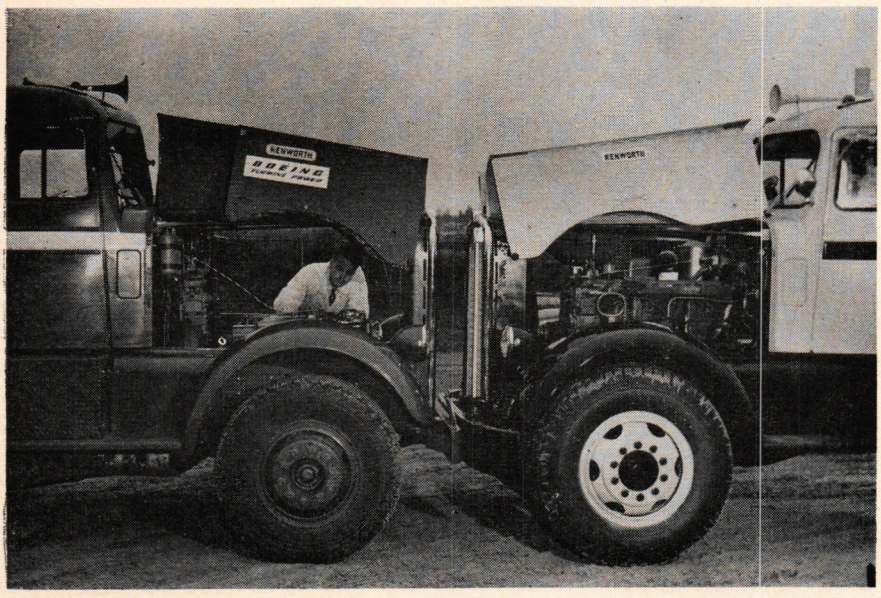
Kingsley Brown is not a newcomer to these pages. In the November issue he presented, "It's Going To Be a Long, Hard Winter," and he has written many articles for the "Societies and Fraternities" page over the past few years. In this article he tells us some facts on one of his favorite subjects—new developments in the automotive industry.

Kingsley is expecting to graduate in Mechanical Engineering this May, the climax to an interesting life at G. W. He is a member of Delta Tau Delta, Theta Tau, and Sigma Tau fraternities and has contributed quite a bit to student life here during the last few years.

Introduction

Of all the cars mass produced in the world today, not one is powered by anything but a piston engine. Most of these are spark ignited, although a few operate on compression ignition. This has not always been the case; in the past such power sources as steam, electricity, and even clockwork have been used. All of these have fallen out of use and it is very doubtful that they will ever be used again. There is, however, one previously untried power source, the gas turbine, that may someday rival the piston engine for the prized place under the hood.

Several companies are already working on gas-turbine vehicles. Rover was the first company to announce a gas-turbine automobile, and Boeing Airplane Company was next with a gas-turbine powered truck. At the present time, six companies have announced gas-turbine vehicles.



Identical trucks, powered by the Boeing 175 hp. gas turbine (left) and a diesel power plant of similar rating (right) are shown for comparison.

—Courtesy Boeing Airplane Company

The Boeing-Kenworth Truck

After testing this turbine truck for a considerable length of time, since its announcement in the spring of 1950, Boeing has made these two conclusions:

1. A large amount of research and development must be done before mass-production of a gas-turbine truck could be undertaken.

2. The gas turbine is an excellent power source for heavy road vehicles, and the expense of development is well justified.

The test vehicle consists of a Boeing 502 gas turbine mounted in a Kenworth truck with a 35-foot trailer. The gross test weight of the truck is 68,000 pounds. Although the turbine only develops 175 horsepower and is connected to a seven-speed transmission, this truck has performance comparable to what it had when powered by a 200 horsepower piston engine with a twelve-speed transmission. This is due to the naturally superior torque characteristics of a gas turbine.

No sound proofing is needed under the hood or in the cab. With only an intake silencer and an acoustic exhaust muffler, the noise level is low enough even at full throttle so that it is not difficult to hold a normal conversation in the cab. Gone also are the throb and shake, the knock and staccato exhaust so characteristic of a truck powered by a piston engine. The smoothness and quietness of the gas turbine should greatly reduce driver fatigue.

Oil consumption is negligible, but the fuel consumption is a weak spot. The average fuel consumption for the Boeing-Kenworth truck is about one gallon each mile as compared to one gallon every three or four miles for piston-engine trucks. Boeing engineers estimate that an increase of 30 to 35 percent in thermal efficiency, which they think can be accomplish-

Gas Turbine . . .

ed by newer developments in compressor and turbine design, and a more efficient transmission and rear axle, will make the gas turbine competitive with the piston engine for powering heavy trucks.

After their experience with this truck, Boeing engineers have found that the most sensitive parts of the turbine are the rotors. The main cause of trouble has been high-frequency vibrations. This is still a problem, but its cure lies in careful design of the components with special attention being paid to their natural vibrational frequencies. Thermal shock, caused by sudden opening of the throttle on hard acceleration, caused blade failure in early tests. This was cured by fuel-feed modifications which limit the rate of increase of fuel feed. Other failures have been caused by foreign objects which have found their way into the engine, and in some instances blades have been broken when they rubbed against the outer casing. The cause of this latter trouble was found to be uneven thermal expansion of the outer casing, and has been cured by re-design.

Boeing 502 Gas Turbine Specifications

Weight, with accessories	240 pounds
Width	23.2 inches
Height	22.95 inches
Length	39.87 inches
Fuel	Diesel Fuel, Kerosene, Gasoline
Brake Horsepower	175
Maximum Brake Torque	580 pound-feet

The latest engine, the 502-10, develops 220 brake horsepower at a reduced fuel consumption rate.

The General Motors Turbocruiser

Two vehicles have been announced by General Motors, a bus and a high-speed car. They are powered by basically the same gas turbine, although the one for the car is somewhat smaller in outside dimensions. Both were made at about the same time (early 1954) but the car has received so much more publicity that many people don't know that the bus exists. Actually, these two vehicles are so different that they could easily have been made by two different companies.

The bus, known as the Turbocruiser, is to be used to determine the practicability of turbine use for normal driving. The bus is ideally suited for this purpose; there is ample room to provide any loading, observers, or instruments that might

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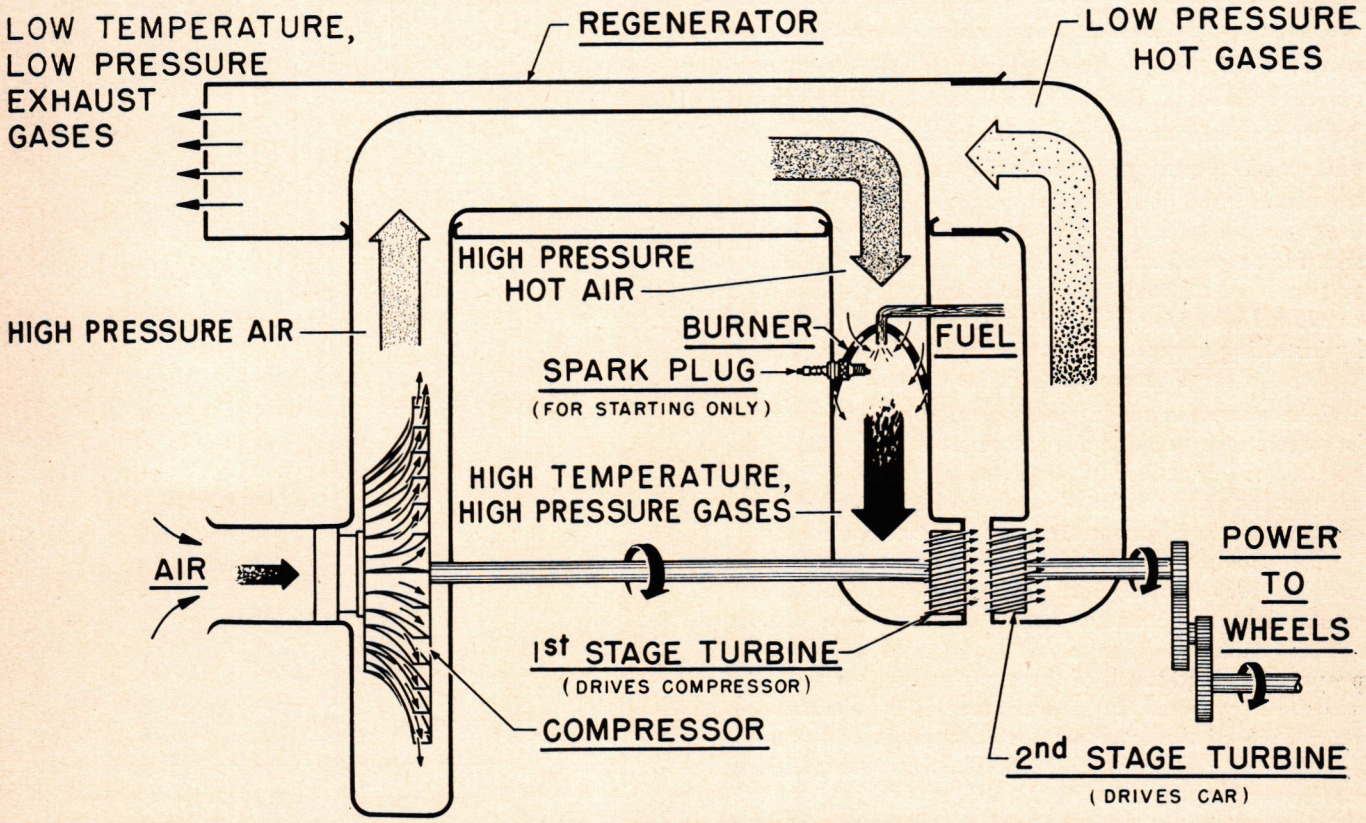

The diagram shows the basic parts of the gas turbine engine and graphically points out the simplicity of the power plant.
—Courtesy Chrysler Corporation

PROPANE: A BETTER AUTOMOTIVE

By Harry M. Brandler, B.E.E. '55

About a year and a half ago the Allied Cab Co., Inc., of Washington, D. C., installed some unusual equipment in one of its taxicabs. The cost of the equipment was $165. With the installation of this equipment, the fuel pump (a source of trouble to many car owners), and the gasoline tank were not needed, so they were discarded. This taxicab was then driven for a grand total of 260,000 miles with no engine repair or overhaul needed over this span. How many of you car owners could make a statement like that? Not only was no overhaul needed, but the oil stayed clean and relatively free of acid for 10,000 mile intervals.

The reader may rightly ask; "What kind of equipment did Allied Cab install?" The answer is simple enough. They installed certain equipment in this taxicab which made it possible to use propane gas as a fuel. This test and all the test equipment was quite an investment for them, but there was an excellent possibility of a good return on this investment, and on investments to follow. They have a fleet of taxicabs which they rent out to reliable drivers. The drivers must pay for the use of the cab, buy gasoline from the gasoline station owned by the company, and buy oil when needed. In turn the company must repair the cab, engine, and body, when necessary. The average auto engine will last about 70,000 miles before it needs an overhaul. An engine overhaul costs quite a bit of money, as many of you know. A taxicab travels an average of 1,000 miles per week. Therefore, every seventy weeks, the company must pay a sizeable sum for an overhaul. If they could extend this interval to two hundred and sixty weeks, they would realize a considerable saving. This is just what they are doing by installing propane equipment on all of their taxicabs. They see a large return on their investment.

The preceeding is just one example of how propane is better than gasoline for automotive fuel. It is the purpose of this article to throw some light on the subject of propane for automotive fuel, and to compare some of the features of propane gas to those of gasoline.

Propane made its debut as an automotive fuel as early as 1910, when a Mr. Peterson operated an experimental automobile on the streets of New York. About twenty years ago several bus companies operated on propane gas, and much of the experimental work on this was done by them. In several areas of the country last year, 50% of the total sales of propane was for automotive fuel. Approximately 2,000 busses were operating on propane at the end of 1953.

Propane is an organic product, composed of four carbon atoms and ten hydrogen atoms. It is a gas at standard atmospheric conditions, but if subjected to pressures of over 100 psi, it is a liquid.

Fuel	BTU/lb	Octane Rating
100% Propane	91,300	125
Gasoline	125,000	85

From this chart, we see that propane doesn't have as many BTU as gasoline, but its octane rating is much higher. As a matter of fact, this 125 octane is so high that absolutely no knock occurs, no matter what load the engine has to carry.

Another important fact which may be overlooked is that with gasoline about 12,000 parts of air are needed for each part of liquid gasoline; with propane only about 25 parts of air are required for each part of propane vapor by volume. Thus, the obvious fact is that with propane, complete combustion is more easily obtainable than with gasoline, simply due to the easier process of proportioning a gas with a gas, as compared with proportioning a gas with liquid. Since such a gigantic amount

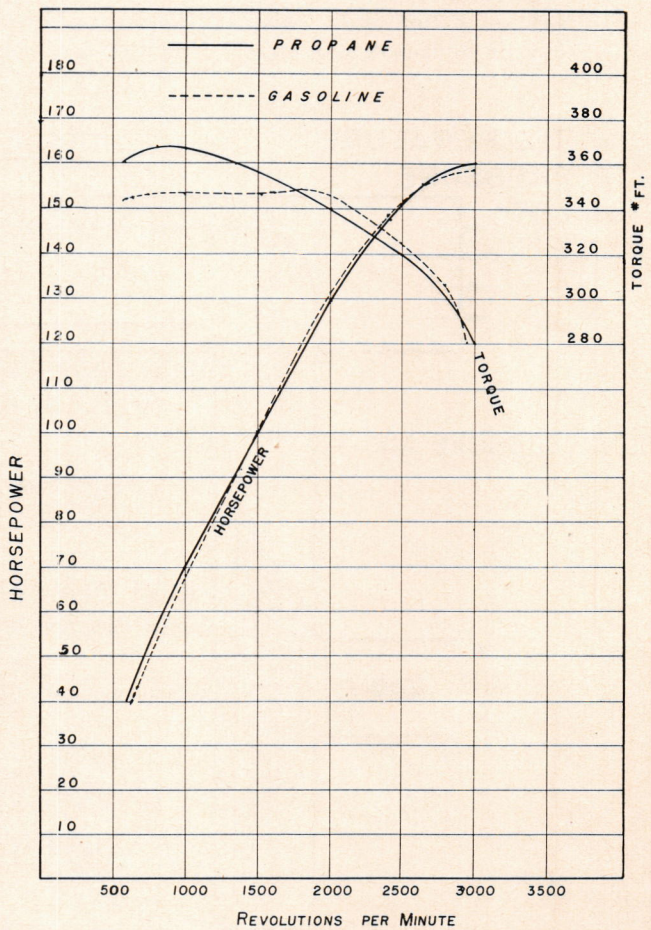

Fig. One—Horsepower and Torque characteristics of automotive engines using gasoline and propane.

FUEL ?

Harry Brandler has again shown his versatility in writing by this article on Low Pressure Gas for automobile fuel, since he is an Electrical Engineering student here. Maybe this versatility is a result of the general curriculum at G. W. of which the school boasts.

After Harry finished the research on this article he remarked that if he had a car now he would certainly convert it to use propane.

Harry is another senior student who has written for this magazine before. His last article was on the new course in soil mechanics which appeared last October. Besides writing for the MECHELECIV *he is a member of Theta Tau and Sigma Tau and is certainly an interesting character on campus.*

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of air is required with gasoline, there is a limit on the compression ratio of a gasoline engine. With so much less air in the case of propane fuel, the compression ratio can be increased greatly (from 7 to 8, or an increase of 15%).

The fuel system of a propane fueled engine is similar to that of a regular gasoline engine, except that no fuel pump is required. Use is made of the carburetor of the engine and a separate device is annexed to supplement the carburetor action. The gas tank is small enough to fit in most trunks, and it holds approximately 16 gallons. The tank is built to withstand 200 psi, since the gas is subjected to 180 psi in order to liquefy it at ordinary atmospheric temperatures. The tank is equipped with a number of safety valves to insure protection against failure. When the gas passes from the tank to the engine, it first has to pass through a heat exchanger, which is activitated by the water from the radiator. The vacuum is provided by the intake manifold. The whole system has an absolute minimum of moving parts, thus greatly reducing maintenance. However, to use propane fuel most efficiently, the ignition system and the fuel system must be in top notch condition. The spark must be the strongest possible, and, because it must be so strong, it must of necessity be a cold spark. The distributor and ignition coil must be adjusted to give the highest voltage obtainable. With this set-up, however, the plugs will last quite a long time, and they will remain clean.

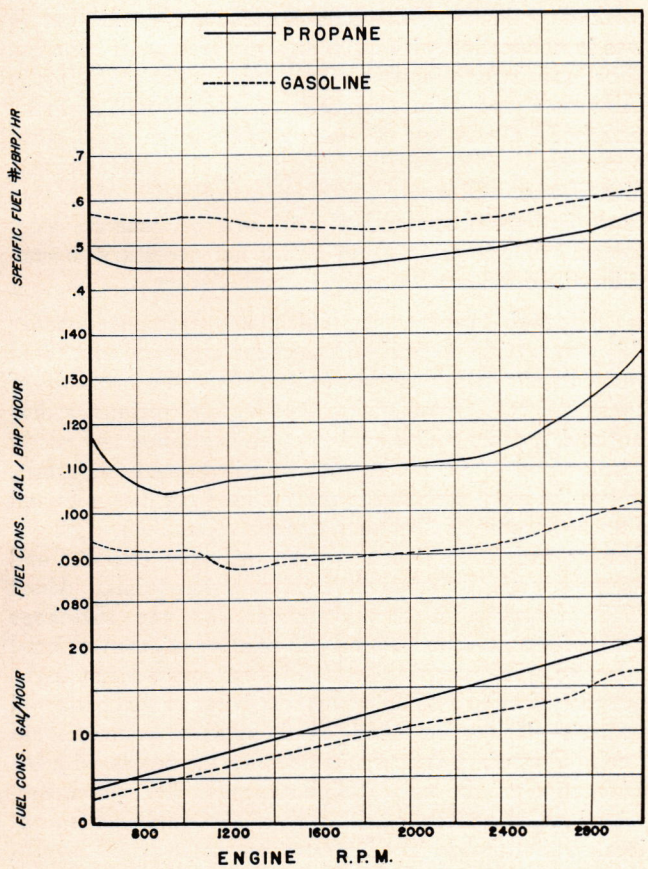

Fig. Two—Fuel Consumption versus Engine R.P.M.

An examination of the curves of Fig. I will reveal the horsepower and torque characteristics of automotive engines using gasoline and propane. At first glance the curves of the two types of fuel seem to be about the same on the average. On closer investigation, however, it will be seen that at lower engine speeds the curves are definitely in favor of propane. The same is true at peak speeds of the engine. Since many of the cabs are equipped with overdrive, the lower range of engine speeds will be used in normal driving. Ordinarily, most engines knock severely when going up a steep hill in overdrive. This is not the case with an engine fueled with propane. Its 125 octane rating will not permit a knock, and its greater torque and horsepower will pull the car up the hill more easily.

Fig. II contains the curves of Fuel Consumption versus Engine RPM. Gasoline has the edge over propane as far as volume goes, but propane has a definite edge over gasoline when weight is considered. Another important item to consider is that the price of good premium (80 octane) gasoline is about 33 cents per gallon. The price of propane (125 octane) is about 25 cents a gallon. Thus propane is 25% cheaper than gasoline of high octane rating. This fact means much to one who does a lot of driving. Incidentally, the miles per gallon for propane gas is slightly better than that for gasoline.

Another common occurrence in gasoline engines is the following: In starting a cold engine, raw gasoline is drawn into the cylinder. Since gasoline is an excellent solvent for oil, it actually washes the residual oil from the cylinder wall and down into the crankcase, diluting the oil therein. For the first few moments of starting and warmup, metal is rubbing against metal, and this condition, if repeated enough, will cause damage to moving parts. With propane gas, this condition is impossible, and this is one of the reasons why an engine run on propane fuel lasts so long without maintenance or repairs.

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THE HISTORY OF A USEFUL BUILDING TOOL

A Prize-wining ASCE Student Paper By William A. Weidemeyer, B.C.E. '55

The facts on and the uses of pre-stressed concrete have been tossed back and forth for many years, but here, for a change, is an article on the development of this tool.

This paper was presented last spring at the student branch of the ASCE and was awarded a prize for the best undergraduate paper, and is presented here as an example of one type of student paper aside from its general interest.

Bill has been very active at GW and was selected as one of the MECHELECIV *October Personalities. By now he should be familiar to all of our readers.*

At the time of the first U. S. Conference on Prestressed Concrete held at M.I.T. on August 14-16, 1951, the use of circular prestressed concrete, including primarily pipes and tank structures was firmly established throughout the world, and American firms were among the leaders in this type of construction. With respect to linear prestressed concrete, including beams, slabs and columns—the components which singly and in combination make up such structures as buildings and bridges—the situation, however, was very different. Virtually all the pioneering work in this field had been accomplished abroad. Over a period of at least ten years, our European friends produced not only a considerable amount of research but an impressive number of actual structures. In the United States however, linear prestressing was a mere infant hardly a year old.

This condemnation of America's lack of enterprise could be considered very unfair by some observers, as the United States has not required the advent of prestressed concrete such as some of the European countries, to whom it was an absolute necessity due to lack of materials, money, and the right equipment. Indeed, in this case, necessity was the mother of invention. In this country, where labor is at a premium, and mechanization makes almost anything possible, the bulkier and more cumbersome reinforced concrete structures proved to be adequate for a longer period of time. So it remained for the European countries to develop this modern building tool.

Please don't jump to the conclusion that Europe's "great minds" created this wonderful building material in a day. Attempts to create some form of prestressing to increase the strength of concrete have been made ever since it was discovered that the weakness of concrete was in tension. It wasn't until 1905 that some form of organization came into existence, and this resulted directly from the general agreement of investigators that the prestressing material would of necessity be steel, and that the chief problems were those concerning the plastic flow of the concrete after its initial set, and the elasticity of the steel, both of which tended to release the pretensioning within a short time after it was applied.

Large sums were spent to improve the quality of both materials. Mr. Freyssinet, for instance, produced concrete that hardened rapidly, with compressive values in excess of 14,000 p.s.i. and used reinforcing steel that had an ultimate strength of about 200,000 p.s.i. With these new materials he was able to use steel stresses sufficiently high so that the shrinkage and flow of the concrete eliminated only a small percentage of the prestress. As a result, many important structures containing prestressed beams and arches were built in Europe during the years preceding World War II.

As mentioned previously, most of the prestressed work done in the United States prior to World War II was in connection with circular structures, such as tanks, silos, and large diameter pipes. In the early 1920's, in Minnesota and other locations, A. I. Hewett designed and built a number of water tanks whose walls were prestressed with steel rods of ordinary structural grade. Mr. Hewett and many other engineers believed at that time that shrinkage and plastic flow of concrete were almost negligible, and that it was not necessary to consider these factors seriously in tank design.

Although many successful tanks were built under this assumption, it gradually became apparent that there were defects either in the designs or in the methods of construction. Occasionally, there was serious cracking and leaking which could not be explained and costly repairs had to be made. Pneumatic mortar, or gunite to use the more common term, was used for the walls and domes of some of these early tanks. Gunite had greater density and imperviousness than ordinary concrete and its use practically eliminated construction joints. About 1941, however, it was rumored that the shrinkage rate of gunite was several times that of conventional concrete. In extensive tests this was proved not to be the case, the fault of the structures lying in that same old nemesis—lack of a good bond between concrete and steel. Freyssinet once again came to the rescue with his advocation of the use of high-strength steel, which permitted an overstress to take care of the small percentage loss, so that the designed prestress was always within the

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ENGINEERING PERSONALITIES

WILLIAM TURNER

William Turner, Assistant Dean of the Junior College and Associate Professor in English, plays a key role in the education of the George Washington engineering students. He handles the "Report Writing" course which is a required subject for all engineering students since the introduction of the new curricula.

As soon as he started teaching engineering students in his "Report Writing" class, he realized that the needs of the engineering major were not the same as those of the Business Administration and English majors. Following this line of thinking, he separated the class and put all science majors into one group for his individual attention. He feels that one of the prime objectives of his course is to teach the engineer to write high quality reports and technical papers. One of his major requirements is that each engineering student in his class submits an article to the Engineering publication, MECHELECIV, for consideration. Before the article is turned over to MECHELECIV, however, he evaluates it for his own grade book.

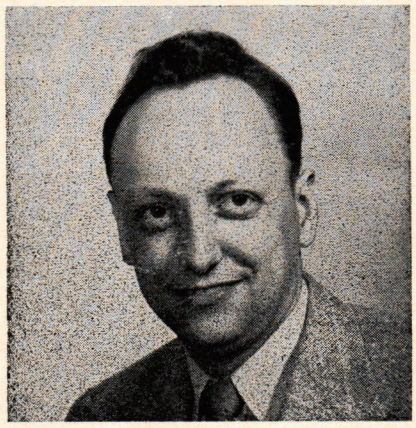
Dean Turner is a graduate of the University of Pennsylvania where he received his A.B., M.A. and Ph.D. degrees. He is a member of the Modern Language Association, the American Historical Association and the Pennsylvania Historical Society.

Dean Turner strongly believes that a student should major in a field in which he has a definite preference. He feels that if a student is interested and curious about his major, half the scholastic battle is already won.

STANLEY VEST

The soft-spoken, mild-mannered Stanley Vest has contributed heavily of his time and know-how to the many activities of The George Washington University Engineering School. Despite being active in many phases of school life, he has maintained a high scholastic standard and was awarded the Sigma Tau Award for maintaining the highest grades in his freshman engineering class.

Stanley, like many engineering students, worked for quite awhile before deciding to obtain an engineering degree. He was with the Rural Electrification Administration for 13



years before coming to G. W. and he still works for that agency during the summer. It is this background that led him to becoming a power engineer at a time when everyone seems to be studying electronics. Stan is also a veteran of World War II, having served with the Air Force in England during the height of the V-2 bombing.

Stanley's hobby is photography and his coverage of the Engineer's Ball and Banquet last year for the MECHELECIV had everyone talking. Instead of using his flash attachment in a normal fashion, he aimed it at the ceiling and used its reflected light. The pictures turned out first class. Stan studied photography at the Agriculture Graduate School and he is now a member of the National Photographic Society. One of his slides is on exhibition in the Smithsonian Institute.

DERRILL ROHLFS

Derrill Rohlfs, a senior in the Electrical Engineering Department, packs a heavy load of activities along with a full-time load of engineering subjects. He has headed such important committees as the Engineers' Ball and Banquet Committee for 1954 and the Book Store Committee.

Derrill's size would make any football coach glow; but unlike many large men, Derrill is supple and agile. At various engineering functions, Derrill and his wife Alma perform every dance effortlessly and faultlessly.

After serving five years with the Navy as an Electronics Technician, Derrill went to work for Philco as a Field Engineer. In 1947, he started studying part time at the George Washington Engineering School, and in 1952, he decided to attend school full time. Once he became a full time student, he treated school exactly like a job and devoted all his time to studies and school activities.

He is a member of Theta Tau, Sigma Tau, the American Institute of Electrical Engineers, the Institute of Radio Engineers, Engineer's Council, and the MECHELECIV staff.

Derrill owns his own home in Temple Hill, Maryland. Besides dancing, his hobbies include stamp collecting, radio and television re-

pairing, and operating an amateur radio station (call letters W3WOX).

After receiving a Bachelor's degree in Electrical Engineering in June, Derrill hopes to continue studying at G. W. for his masters degree.

A NEED FULFILLED M. E. A.

By Mike Brady, B.E.E. '56

To answer an ever-increasing need for trained men and women in the field of engineering administration, a graduate program leading to the degree of "Master of Engineering Administration" is being offered for the first time this semester. This program alone places G. W. in an almost unique class; fewer than six Universities offer similar programs.

Through the years, it has become more and more apparent that when an engineer or scientist advances to the higher echelons in industrial, military, or government practice, he almost invariably will occupy a supervisory or administrative position. This was confirmed in a recent survey by the Navy Department which showed the extreme need for higher level training in engineering management. The survey showed that as engineers and scientists progress, in general, they become engaged in management activities. However, it was found that engineers and scientists were not properly trained for higher-level management. At the time, the "Management for Engineers" course offered by the G. W. College of General Studies at the Navy Department was found to be extremely popular, but inadequate in the face of a greater need.

These facts led the Navy to establish the "Educational Committee on Engineering Administration" which approached George Washington University to develop a graduate program. The final program resulting from the cooperative efforts of the

(Please turn to page 23)

Were You Here?

Beginning with Vol. 2, No. 2, the MECHELECIV was mimeographed instead of dittoed. This resulted in a much better appearance and it was considerably easier to read. The first issues, which were dittoed, became quite faint along toward the end of the printing run and these were the ones which were placed in the editor's files. Unfortunately most of the early issues which are on file, are too faint to be reproduced. Other improvements and changes in the magazine were also made at this time.

The magazine, which was now one year old, was enlarged to 3 pages at the beginning of Vol. 2. This slow but constant rate of growth is one of the features of the MECHELECIV, which from its very beginning, has characterized it. It follows logically that an increase in the size of the magazine will also require an increase in the number of persons on the staff and it did.

The staff had increased to 12 persons and the editor, Fred Holcomb, now had an assistant in the person of Lon Berkley. This grew out of the need for more people to put out the enlarged magazine which the engineers desired. We pointed out earlier that names which are familiar to today's students appear frequently on the magazine staff.

The Column Coordinator, beginning with Vol. 3, was H. A. Mikolf-

(Please turn to page 16)

HAPPY NEW YEAR

CWU ENGINEERS MONTHLY

Mecheleciv

BUY ANOTHER BOND

VOL V NO.III — WASHINGTON, D.C — DECEMBER 1945

Merry Christmas

BALL FOR '46

Plans for the Fifteenth Annual Engineers Ball have been completed, announces the President of the Engineers Council, Dan Andrich. Alfred Barauck, Chairman of the Ball Committee, states that the Wardman Park Hotel is the place, February 16, 1946, the day and that the music is to be furnished by Roy May and his orchestra.

SCHOOL STATISTICS

The first issue of the MECHELECIV this year published an article on enrollment increase in which a marked increase was predicted. This increase did materialize as was announced in the last issue. Since then it has been learned that a marked change has taken place in the percentage of part-time to full-time students. It has always been true that the part-time outnumbered the full-time students four to one. This term however, the worm has turned and we have 55 percent full-time to 45 percent part-time students. This is partly due to a greatly increased freshmen class which has always been predominately full time.

It has also been learned that the University is discussing plans for a summer school in Engineering for those that wish to attend. It is expected that two semesters work will be offered during the summer so that it will fit in with the regular work during the winter. It is hoped that more definate information will be available for the next issue.

ENGINEERS BELL

Now that, at long last, we have acquired a school bell, the problem is what we shall do with it. Any suggestions should be referred to John Doane, chairman of the committee set up to handle the problem.

A brief history of the bell should be interesting. It was cast for a German ship built before the first World War. During that war President Wilson confiscated the ship for his personal use to go to the peace conferences, and renamed it the "S. S. George Washington". M. E. Prof. Arthur F. Johnson obtained the bell for us from the Navy in Norfolk. This 600 lb. wonder is now housed in the M. E. lab. and anyone wishing to see it is welcome at anytime.

Sigma Tau suggested that we build a special building for our bell, but this seems a little far-fetched. If no ideas are forthcoming, it may spend the rest of its bronze life hidden in the M. E. lab. This would be truly a pity, for it is beautiful.

CALENDAR

January

2 Society Meetings A.S.M.E., A.I.E.E and A.S.C.E.

9 Engineers Council Theta Tau - short

16 Sigma Tau - long

YULETIDE TREE

The Engineers Council has erected their annual University Christmas Tree which can be seen on Lisner Terrace. The Tree Committee Chairman, Dave Carlson, and a work crew of council members procured the tree in Fairfax with the aid of Prof A.D Hitchcock, Head of the Civil Engineering Department. (Ed. Note, story next issue).

The presentation which will take place after the MECHELECIV has gone to press will be on Monday, December 17, at 5:45 pm. Dan Andrich, President of the Engineers Council, will present the Tree to Dean Feiker, who will turn it over to the University. President Marvin will accept it for the University and will throw the switch to illuminate the Tree.

Before the war, the Christmas Tree was an annual gift of the Engineers to the University. The custom was discontinued after 1941 due to transportation difficulties. Last year it was resumed, and a live tree behind Corcoran Hall was decorated.

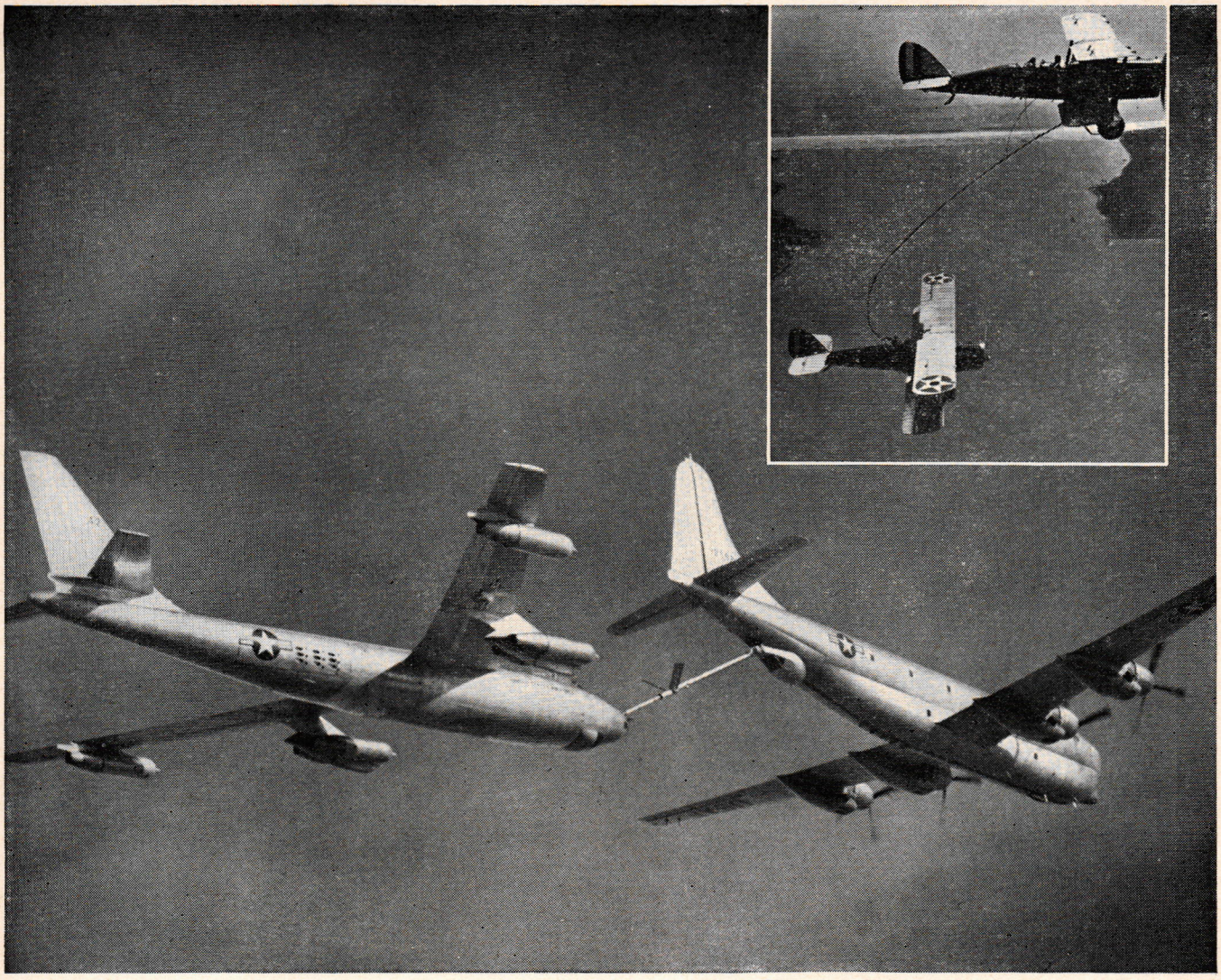
STAFF ADDITIONS

The MECHELECIV announces two new additions to its staff. Marjorie Rhodes, Features Editor, and Bernadine Dunfee, Column Coordinator, both of whom are members of the A I.E E.

The paper needs more staff for its new aims and plans. A Photographic Editor, photographers or even photographs are desperately needed, as can be noted by the lack of pictures in this and the last issues. Writers, reporters and typists are also in demand.

In 1945 the MECHELECIV was still published in newspaper form. The December issue shown above told of the seventh annual Christmas tree.

1923—first aerial refueling

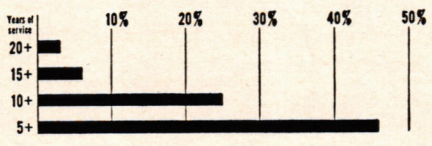


1954—Boeing KC-97 tankers completed 16,000 refuelings last year

30 years of progress in aerial refueling

The small picture shows the first aerial refueling by the Air Force. The large picture shows a Boeing KC-97, today's standard Air Force tanker, transferring 600 gallons of fuel a minute to a Boeing B-47 Stratojet bomber.

Boeing pioneered aerial refueling tankers and equipment. Further, during its 38 years, it has constantly pioneered trend-setting designs in commercial and military aircraft. This has meant such continuous growth that Boeing now employs more engineers than ever before, including the World War II peak. Boeing offers *stable* careers to engineers of virtually EVERY type: civil, mechanical, electrical and aeronautical. The company employs draftsmen and engineering aides for routine work, thus freeing engineers for more creative assignments.



Boeing engineers enjoy long-range careers—46% of them have been at Boeing 5 or more years, 25% have been here 10 years, and 6% for 15 years.

In addition to stability, Boeing offers an unusual variety of research, design and production opportunities, including work with new materials, guided missiles, jet bombers and transports, and research in nuclear-powered aircraft and supersonic flight.

Boeing makes it possible for engineers to take graduate studies while working, and reimburses them for all tuition expenses.

For further Boeing career information, consult your Placement Office, or write:

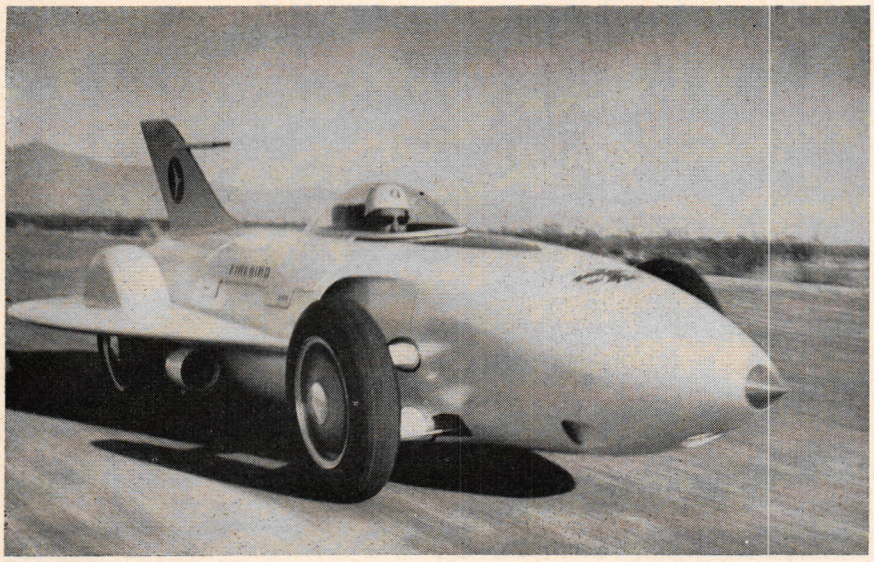
JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Company, Seattle 14, Wash.

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS

MEET THE AUTOMOTIVE GAS TURBINE

(Continued from page 7)



The G.M. Firebird in action near Phoenix, Arizona.—Courtesy General Motors

be desired. The exhaust is routed up through the roof, so that the high exhaust temperature cannot endanger anyone. It looks like an ordinary bus, and could probably be run on public roads without anyone suspecting that it is any different from its many piston-powered brothers. So far, no performance data or progress reports have been released on the Turbocruiser.

The General Motors Firebird

The General Motors Firebird represents the radical, complete departure from present-day American design practices. It is a single-place car designed and built for two purposes:

1. To test, in high-speed, straight-line runs, the G. M. gas turbine and other unusual design features.
2. To gain publicity.

At first glance, the Firebird resembles an experimental, delta-wing jet plane. Closer examination shows that almost all of the components of this car were specially made. Some of the more interesting of the design features are as follow:

1. A fiberglass body, wind tunnel tested at Cal. Tech. With the present power plant, the data taken at Cal. Tech. indicates that the top speed should be about 235 mph.

2. Brake drums nearly as large as the wheels. These are made by the Alfin process, wherein a layer of aluminum is chemically bonded to the fast iron brake drums so as to greatly increase the rate of heat dissipation. Braking from high speeds is further aided by brake flaps.

3. A front suspension featuring torsion bars.

4. A rear suspension of the de Dion type, which has the added feature of absorbing no rolling moment when the car corners.

5. The turbine, which develops 370 horsepower yet weights only 750 pounds.

It is designed according to accepted turbine practice.

The major dimensions of the car are as follows:

Wheel base, 100"; Tread, 50" front, 54" rear; Height, 41"; O. A. length 222.7"; Wt. empty 2440 lbs; Wt., loaded 2800 lbs.

The Plymouth Turbine

This car, as it stands now, comes very close to being competitive with present-day piston-engine powered cars. The turbine has been mounted in an otherwise stock 1954 Plymouth sports coupe. The car appears ot be just an ordinary Plymouth, and can be spotted only by the large exhaust pipe and a small chrome nameplate on the trunk which says simply "Turbine." The only modifications made in this car were the removal of the piston engine, its cooling system and the transmission, and the installation of the turbine and a transmission containing one forward and one reverse gear.

The turbine itself is designed along conventional lines, except for one feature; it has a regenerator. Up until this unit was announced, it was generally considered impossible to design a regenerator small enough to fit under a car hood and still be efficient enough to be useful. The Chrysler unit is so efficient that, in a recent test, the car averaged 14.9 miles per gallon of straight-run gasoline at an average of 40 mph. This is worth noting, since other turbine-powered cars average a maximum of 3 or 4 mpg under similar conditions.

Other advantages of the regenerator are:

1. Reduction of exhaust temperature. The exhaust is actually cooler than that of a conventional automobile.

2. Reduction of noise level. This is because no excess air has to be run through the turbine to cool it, as is the case in other gas turbines.

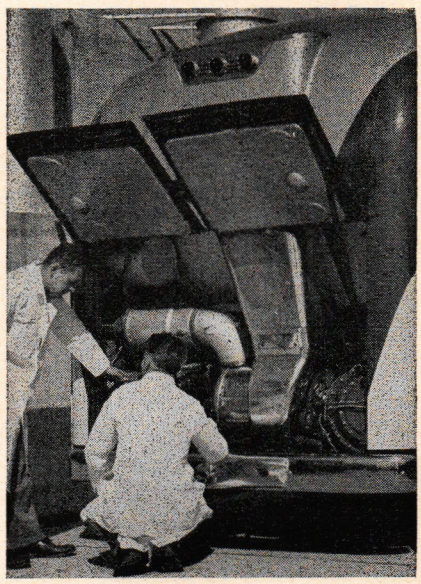
Just how this regenerator works is a very closely guarded secret.

The engine itself develops 120 brake horsepower with an operating speed range of 20,000 to 60,000 rpm. Because of a turbine's naturally superior torque characteristics, this unit actually gives the car performance comparable to that of a 160 HP piston engine, and weight as installed shows even greater saving since there is no radiator. A normal six-volt electric system is used, and a generator for the battery is driven from the turbine. The turbine, together with the regenerator and reduction gear box, measures only 28" high, 32" long and 33" wide.

Conclusion

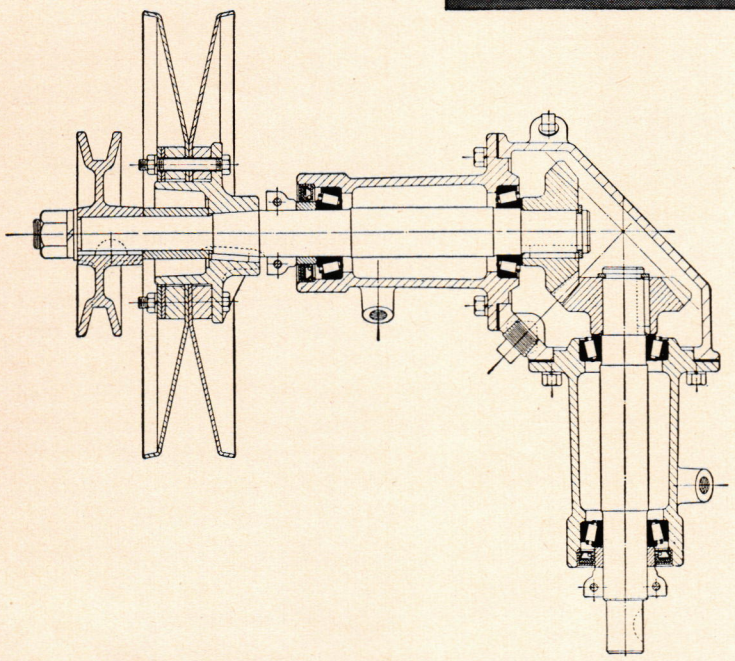
The gas-turbine car is, as all the companies readily point out, a thing

(Please turn to page 16)



The G.M. Turbocruiser—one of the most practical test vehicles ever made. —Courtesy General Motors.

Another page for **YOUR BEARING NOTEBOOK**

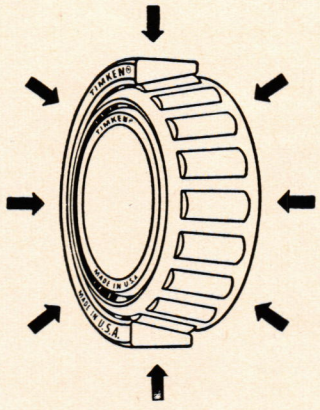


How to increase bevel gear life

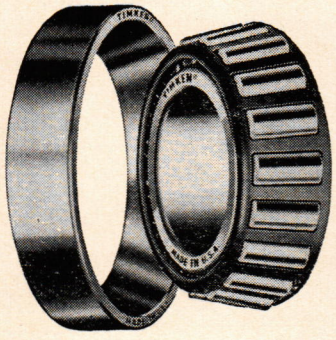
The shafts that hold the bevel gears in this farm machine gear box carry two kinds of loads. Loads from the bevel gears run 1) along the shaft and 2) at right angles to it. Timken® bearings, being *tapered,* carry both loads at once, hold gears rigidly in place. Perfect tooth-mesh is maintained; gears last longer.

How TIMKEN® bearings hold shafts rigid

The line contact between rollers and races of Timken bearings gives shafts rigid support over a wide area. Shaft deflection is minimized. And end-play is eliminated because the tapered design of Timken bearings lets them take radial and thrust loads in any combination.

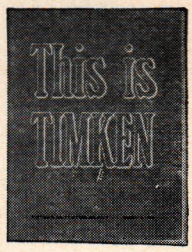


TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓞ AND THRUST →ⓞ← LOADS OR ANY COMBINATION ✳

MEET THE AUTOMOTIVE GAS TURBINE

(Continued from page 14)

of the future. Some say it may be as long as 25 years before gas turbine cars are ready to go into production. The advantages of the gas turbine over the piston engine, listed below, will make it worth the cost of development:

1. High power output for its size.
2. A built-in torque converter, obviating the need for a clutch, multi-speed gear box, or automatic transmission.
3. Low-cost fuel can be used. Petroleum products which were previously waste materials can be put to use.
4. Five times fewer parts.
5. Simplified ignition and lubrication systems.
6. Easier cold starting.
7. No reciprocating parts.

The items yet to be solved are the following:

1. Poor fuel economy. Chrysler has already solved this, and other companies will probably find something also.
2. Low braking torque. There is little "hold-back" to use when descending hills.
3. Higher operating temperatures, requiring scarce and expensive high-temperature alloys for the turbine wheels.
4. Larger air ducts are required.
5. High rotating speeds, requiring careful balancing of the parts.
6. Public resistance to "something new."

If these things can be overcome the gas turbine will provide the public with the smoothest power available.

WERE YOU HERE?

(Continued from page 12)

sky and of course this is none other than our own Professor Miklofsky of the civil engineering department. A follow-up on various former staff members shows that they all have had, without exception, successful engineering careers and it appears that Mecheleciv staff membership was the first step down the road of success. It appears that many successful careers began on the magazine.

...4,000,000 answers later

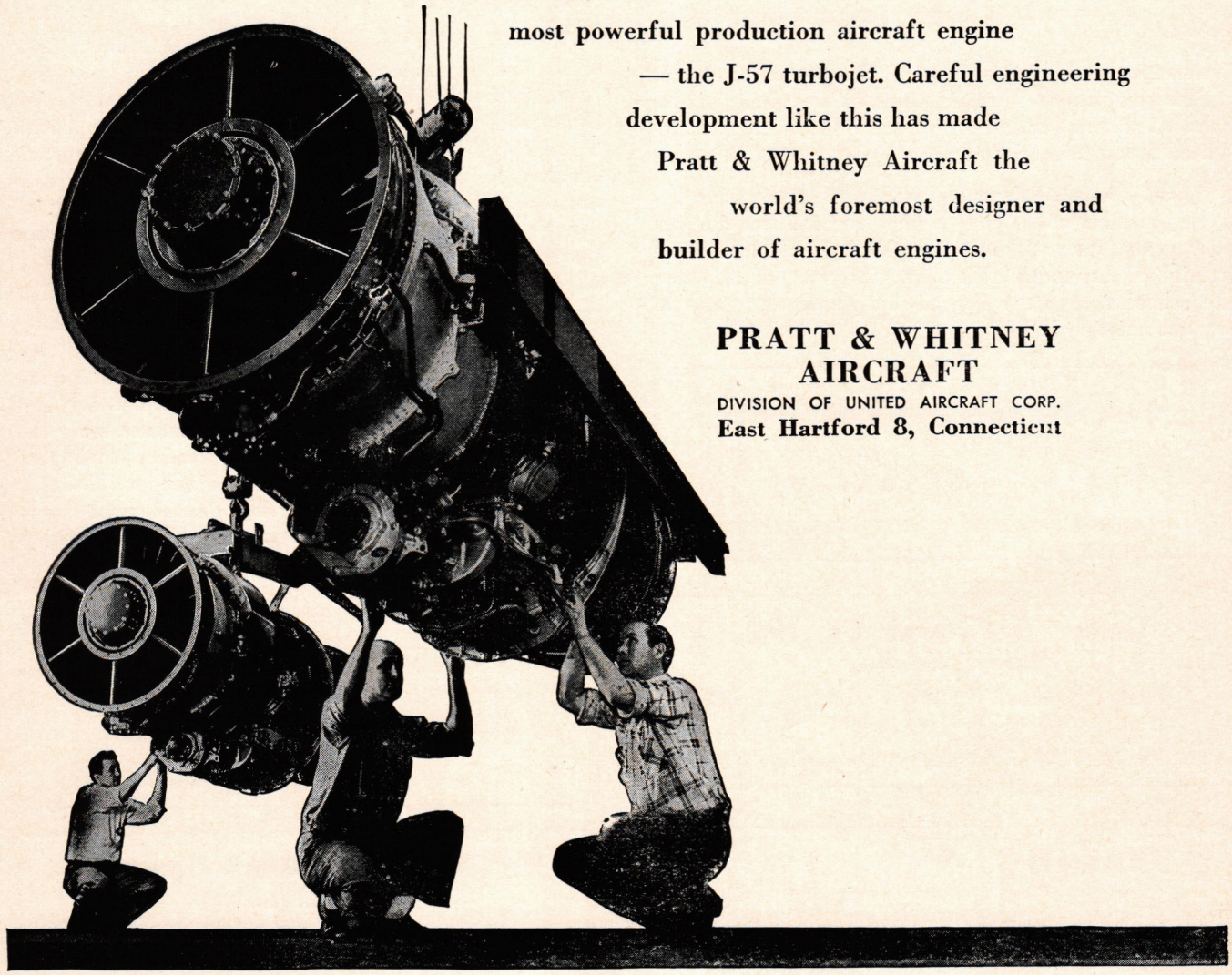
A few figures tell the story.

. . . 7 years of painstaking analysis, research and design by engineers from nearly every field of technology.

14,200 hours of experimental engine operation in test cells and in flight test.

4,000,000 individual, complex mathematical problems solved by electronic computers.

As a result, America now has the world's most powerful production aircraft engine — the J-57 turbojet. Careful engineering development like this has made Pratt & Whitney Aircraft the world's foremost designer and builder of aircraft engines.



PRATT & WHITNEY AIRCRAFT
DIVISION OF UNITED AIRCRAFT CORP.
East Hartford 8, Connecticut

NEWS AND VIEWS

THETA TAU HAS SHRIMP FEAST

The weatherman blessed November 11 and the Theta Tau Shrimp Feast with bright skies and fair weather. Alumni, members and their guests tromped to the stag affair held at Paul Kuzio's picnic ground to enjoy hot dogs, beer and deliciously spiced shrimp prepared by chef Tom Flanagan. Between servings of shrimp and beer, almost everybody found time to enjoy horseshoes, a game of volley ball, or one of the quick-and tumble touch football games that was played. As darkness gathered and all the hurried photographers finished their multitude of snapshots, the singing of small groups mingled with the clinking of beer cans. It was almost unanimous that this affair should most certainly be repeated.

ANN CHASON'S SHOWER

Ann Chason's invaluable services will no longer be available to us engineering students. Her capabilities in directing the business of the School of Engineering will be exchanged for the more taxing task of directing a household and rearing a family.

Last month Ann was given a baby shower by the office staff, Engineer's Council, and the engineering fraternities and societies here. She received a great number of gifts such as a bottle sterilizer, baby scales, dresses, diapers, and many of the other necessities required by an infant.

Ann graduated from George Washington and has been a member of the engineering office staff for the past four years. She will make her home in the little community of Annandale, Virginia. The best of all from the school accompany her as she prepares to take on her new mission in life.

HOMECOMING DANCE — 1954

The Engineers table at the Homecoming dance November 6 at the National Guard Armory.

ME 133 CLASS TRIP

Members of Professor Greeley's Combustion Engines class recently attended a tour of the Naval Engineering Experimentation Station which is located at Annapolis, Maryland, directly across the river from the Naval Academy. The class visited the Internal Combustion Engines Laboratory which is one of six similar laboratories concerned with the development and testing of Navy's diesel engines. This visit is an annual event perpetuated by the efforts of Professor Greeley.

Mr. James Blose, a G.W. engineering graduate of 1935 conducted the tour which exhibited such outstanding devices as a free-piston engine used to supply hot gasses for operating gas turbines, a "knock-test" engine for rating diesel fuels to determine the cetane rating, and a small gas turbine fire pump. Also featured were the refrigerated rooms used to test cold weather starting of engines, the Fairbanks, Morse and General Motors engines currently used in our Navy's submarines, and the 16 cylinder "X" diesel engine now being developed for the submarine service.

"Allis-Chalmers Graduate Training Course Gave me a head start"

says GERALD SMART

Marquette University, BS—1948
and now Supervisor of Plant Engineering,
Allis-Chalmers, Norwood, Ohio, Works

"MOST MEN graduating from college don't have a clear idea of what they want to do. These individuals are helped by Allis-Chalmers Graduate Training Course to find the right job whether it be in design, sales, engineering, research or manufacturing.

"My case is a little different, however. I started the course with all my interest centered on tool design and 'in-plant' service. The reason is that I started getting vocational guidance from some very helpful Allis-Chalmers men back in 1940."

Served Apprenticeship

"At their suggestion I had gone to school part time while working full time. This not only gave me the chance to serve an apprenticeship as a tool and die maker, and earn money, but I learned what I wanted to do after graduation.

"Then came the war and service in the Navy. After the war I finished school. By the time I started on the course in 1948, I knew what I liked and seemed best fitted to do. As a result, my entire time as a GTC student was spent in the shops.

"The 18 months spent in the foundry, erection floor and machine shop have all proved valuable background for my present job.

"As supervisor of plant engineering at the Norwood Works, I am concerned with such problems as: Plant layout, material handling equipment and methods, new construction, new production methods to be used in building motors, centrifugal pumps, and *Texrope* drives. It's an extremely interesting job.

"From my experience, I'd say, whether you're a freshman or a senior it will pay you to talk to an Allis-Chalmers representative now. You can't start planning your future too soon. And you can't plan starting at a better place, because Allis-Chalmers builds so many different products that you'll find any type of engineering activity you could possibly want right here."

Facts You Should Know About the ALLIS-CHALMERS Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training. Length and type of training is individually planned.

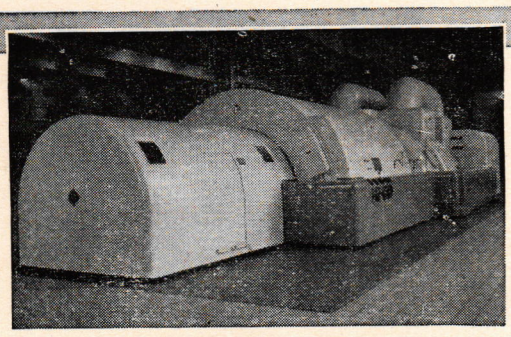
3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, specialized equipment or industrial apparatus with which he will work, such as: steam or hydraulic, turbogenerators, circuit breakers, unit substations, transformers, motors, control pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

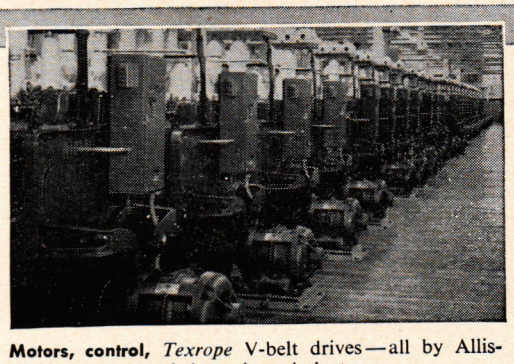
5. He will have individual attention and guidance of experienced, helpful superiors in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisc.



Steam turbines, condensers, transformers, switchgear, regulators are built for electric power industry.



Motors, control, *Texrope* V-belt drives—all by Allis-Chalmers are used throughout industry.

ALLIS-CHALMERS

Texrope is an Allis-Chalmers trademark.

C-5678

PROPANE—A BETTER AUTOMOTIVE FUEL?

(Continued from page 9)

With a gasoline engine, the oil in the crankcase must be changed approximately every 2,000 miles. If you have seen oil drained from a crankcase, you'll remember how dirty it was. This dirt is composed of carbon and fuel soot, oxidized fuel and/or oil, and acid. With a propane engine, there is hardly a trace of dirt and the acid number is lower than that of gasoline. Two pick-up trucks were tested recently, one with a gasoline engine and the other with propane equipment installed. These trucks were doing the same type of service in the same interval of time and in the same general location. The chart below shows some of the results gained from this test:

	Propane	Gasoline
Odometer reading	18425	19647
Miles on oil	5970	2330
Viscosity	400	330
Insolubles	trace	2.0
Carbon and Fuel Soot	trace	1.1
Oxodized Fuel and Oil	trace	1.0
Acid Number	0.50	0.60
Ash	0.033	0.475

An engine powered with propane gas runs much smoother than one powered with gasoline. This is self evident when considering that a small part of gasoline must mix immediately with 12,000 parts of air, while a small part of propane must mix immediately with 25 parts of air. The propane can be seen to diffuse quickly since it is a gas. Gasoline, being a vapor, cannot do this as well.

As has been previously explained, a propane engine will take climb much better than a gasoline engine, and with less depression of the accelerator. The overall cost of a propane engine is much cheaper than a gas operated engine.

For all these reasons and many more, the Allied Cab Co., Inc., is installing these propane units in all their cabs. Other cab companies will soon follow suit, and busses will soon switch over. In the not too distant future, wouldn't it be surprising if fifty percent of the fuel used for automotive purposes is propane.

COLONIAL PUZZLE TRIAD

The cryptogram is a message in coded form. The words and letters appear in their proper order and with proper punctuation, but different letters have been substituted for the actual ones. No letter is substituted for more than one other letter.

One way of approaching this problem is to look for the letter substituted for "E", since this letter normally appears the most often. Single letter words could only be "I" or "A". From there you're on your own with only your hunches and knowledge of English sentence structure to help you.

I CRYPTOGRAM:

I RANESOLD SIT GA ZAXZAVATLAH GD I RASLEZ, QCKSC KV I VLZIKJCL NKTA CIRKTJ IT IZZEQ ZAXZAVATLKTJ LCA HKZASLKET EB LCA WELKET ITH I NATJLC ZAXZAVATLKTJ KLV WIJTKLPHA.

II PROBLEM:

Williams, who was born in the last century, suddenly realized on his last birthday in 1944 that his age in years was twice the sum of the four digits of the year in which he was born. Also, his son's age in years when celebrating his birthday in 1944 was the sum of the four digits of the year of his birth. How old was Williams in 1944 and how old was his son?

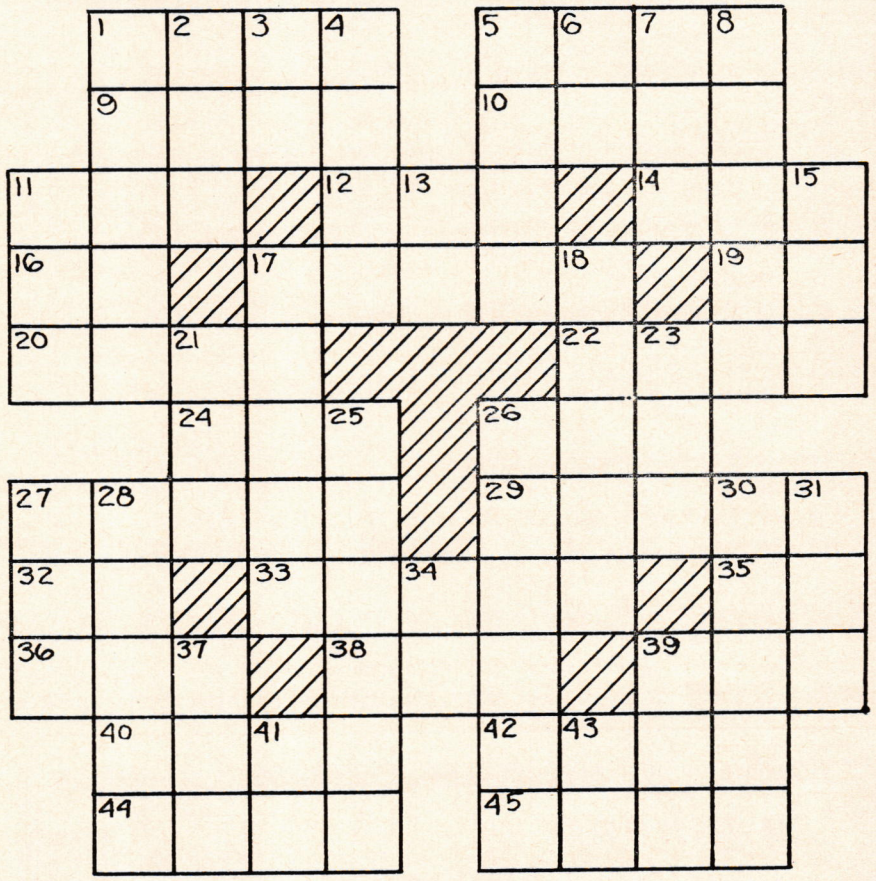
ANSWERS TO NOVEMBER TRIAD

I. The strength (or intensity) of a magnetic field is expressed in terms of the force that the field exerts upon a north magnetic pole in the field. Magnetic field strength is defined as the force per unit north pole that the field exerts on the pole.

II. Twice.

III.

WEIR TREK
ARNO RARE
ETA PSI GAS
ME AESOP TI
FRAT ERST
FLO BOA
METAL ENTER
MN SECTS RA
FOB NET TOG
CASE EGAD
HACK RODE



III. CROSSWORD

ACROSS:

1 Container
5 Poker stake
9 French girl friend
10 Parts of the head
11 Mountain
12 Atmosphere
14 Pronoun (poss.)
16 Measure of length (abbv.)
17 A city in Ohio
19 Section of Bible (abbr.)
20 Pre-revolution Russian ruler
22 Snakes
24 Unknown (L. Abbrev.)
26 Mimic
27 Polynesian islands
29 Part above
32 New element (Sym.)
33 Daughter of Tantalus
35 Active element (Sym.)
36 Article of clothing
38 An athletic Association (abbr.)
39 Fuss
40 Concrete constituant
42 Be in transit
44 Parts of face
45 Never (contr.)

DOWN:

1 Compounds
2 Type of referee (abbr.)
3 Note of scale
4 Apex
5 Denoting air (pref.)
6 Active element (Sym.)
7 Prefix—three
8 Hinder (law)
11 Behind
13 Element (Sym.)
15 Streets (abbr.)
17 Inert element
21 Point
23 Prefix - seven
25 Water nymph
26 Light brown
27 Unhappy
28 Entertain
30 Older person
31 River (Spanish)
34 On account of (abbr.)
37 Measure of time
39 Drink
41 Born (French)
43 That is (L.)

ENGINEERING NEWS

LIQUID METAL PUMP

Operating on an electromagnetic principle, with no moving parts or packing glands, a new pump designed for general usage wherever liquid metals must be forced from point to point has been introduced by Callery Chemical Company of Callery, Pa.

The pump operates on a basic electromagnetic principle. The liquid to be pumped, of course, is a conductor of electricity. When an electrical current is passed through the metal, in a direction perpendicular to a magnetic field which surrounds the metal, it produces a force which sets that metal in motion within the pumping section. A pump of this type will effectively pump those fluid metals which have a lower electrical resistance than that of the pumping section's walls.

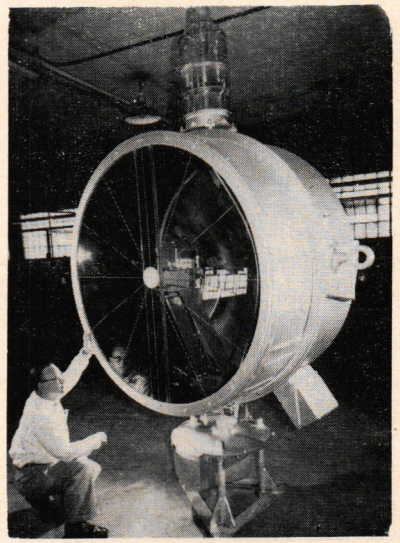
The magnetic field is produced by four coils placed one on each of the legs of two U-shaped laminated magnetic field cores. These cores are attached to the device so that the ends of the U-shaped cores are against the flattened part of the pump tube, perpendicular to the direction of the armature. The coils on the cores are connected to supply the required flux in the proper direction.

The pump can be operated from single phase, 60-cycle alternating current voltages. Flow rates are positively controlled from zero to maximum by an adjustable autotransformer. The pump may be used to move any liquid metal which will wet the pumping section and has a high conductivity. The pumps are tested with sodium-potassium alloy at 1000 degrees F.

RADAR HEIGHT-FINDER

A New York radar height-finder on test at General Electric's Syracuse, N.Y. plant, detects planes three times as far as previous units of this type. Radar's energy is concentrated in a narrow beam like that of a searchlight and is powerful enough to light fluorescent lamps over a hundred feet away. GE and Griffiss Air Force engineers at Rome, N.Y., colaborated in developing the unit. The company is making the new radar in mobile and fixed versions and has supplied a large quantity for use in strengthening the radar fences guarding the North American continent, and for defense posts in countries receiving aid from the United States under the Mutual Defense Assistance Pact.

GIANT SEARCHLIGHT



A huge light, one of the world's largest and brightest, capable of throwing its beam aproximately 120 miles, has been shipped to Dallas, Texas, by the Westinghouse Electric Corporation's lighting division.

The searchlight has a reflector five feet in diameter, stands more than 11 feet high, and weighs 1200 pounds. Originally a carbon arc light used as an antiaircraft searchlight during World War II, it was modified by the addition of a 2500 watt short-arc mercury-vapor discharge lamp, developing 275,000,000 candlepower and a rotating base constructed of aircraft steel and aluminum capable of withstanding 100-mile-an-hour gales. A small, one-sixth horsepower motor will drive the light as it rotates as a rate of 12 revolutions per minute from dusk to dawn.

It will be installed as an attention drawing beacon atop the new 150-foot-high ornamental tower of the Republic National Bank Building in Dallas. When in place, the searchlight will be 598 feet above the street level.

— FOR THE ALUMNI —

A PREVIEW OF THE ALUMNI PAGE TO START IN MARCH

BARE FACTS

A large portion of our staff this year is composed of senior students, who in a few weeks will themselves become alumni. It is natural, therefore, for us to consider even more heavily the place of the MECHELECIV among the alumni.

Here we have a magazine whose circulation is approximately 1500 copies to alumni, 600 copies to students, and 200 copies to organizations, schools and advertisers. This is the only magazine published for this particular audience.

In looking over these figures one quickly comes to the conclusion that this magazine is for the alumni. Although we would like to see more of the magazine for the alumni, this is not the case. The reason is a lack of alumni suport for the magazine, and by support we are referring to news.

We are doing something about this, though. The first step is the inclusion of a monthly report from your alumni association which, you notice, appears on this page. The second step is up to you.

This second step will be explained in a letter you will receive from your alumni association in the next few weeks.

We hope to have your help in the future so that we may fill our place among the alumni and, as President Conner states, "further the partnership between the undergraduates in the School of Engineering and its alumni."

No, we have not forgotten our alumni. Beginning with the March issue this page will contain items for the alumni, such as news of the Alumni Association and the alumni themselves.

We hope you will do your part to make this page a success—by giving us some news for our alumnews column. You may use the form at the bottom of the page, if you wish, or—better yet—send us a letter with the information and any suggestions you might have for this page or for improving the magazine.

A NEED FULFILLED

(Continued from page 12)

Committee and the University is designed to meet the needs of government employees, non-government employees and Navy personnel.

The program leading to the degree of "Master of Engineering Administration" is not merely another degree offered by the inclusion within the school curriculum of a series of graduate-level courses. It represents an almost entirely new concept of graduate learning. The discipline for the Master's degree is based on a faculty-student relationship having many of the aspects and advantages of the classic master-apprentice relationship in which the talents and needs of the individual student are the determining element of the curriculum.

ALUMNOTES

By Harry C. Connor, *President Engineers' Alumni Association*

With this issue of MECHELECIV, the Engineer Alumni Association is beginning a series of articles to better inform engineer alumni of the activities of their Asociation.

This magazine, published by the fine young men and women now enrolled in the School of Engineering, has as its readership primarily alumni of the University. It is mailed without charge to all graduates of the School of Engineering. It is therefore important, I think, that the Engineering Alumni Association should take a fuller advantage of the columns of MECHELECIV to present and promote its many activities for the betterment of our Alma Mater.

The officers and Executive Committee of the Engineer Alumni Association have drawn up an outstanding program of activities for 1955. These events include–one–increased membership in the Engineer Alumni Association; two–increased support of MECHELECIV; three–celebration of ground breaking for the Tompkins Hall of Engineering; four–Annual Engineer Alumni Association Dinner; and five–the publication of an Engineer Alumni Directory.

Details of this program will be outlined in the coming issues of MECHELECIV—a magazine which exemplifies the partnership between undergraduates in the School of Engineering and its alumni.

To: ALUMNI EDITOR
MECHELECIV MAGAZINE
DAVIS HODGKINS HOUSE
THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, D. C.

From: _____
_____
_____
Degree and Date _____

I am glad to do my part to make the new alumni page a success. Here are a few comments for the Alumnews column on where I'm working and what I am doing.

_____
_____
_____
_____

I am( ), I am not ( ) receiving MECHELECIV by the 18th of the month.

PRESTRESSED CONCRETE

(Continued from page 10)

limits intended. For instance, if the reinforcement available is strong enough to take an initial stress of 140,000 p.s.i. and losses of 35,000 p.s.i. were anticipated, then a working stress of 105,000 p.s.i. was induced in the steel and concrete unit. Under such conditions there is always a residual compressive stress in the concrete. Tension of concrete results in the release of compression. This, the major prestressing problem, was cited to prove that the development of prestressed concrete was not merely an empirical development. Even though Europe had gone through the various stages of trial and error development of prestressed concrete, it leaves the impression that the U. S. would not take anybody else's word for the facts discovered by others, but like a child, had to find out for themselves. This is not to imply that the U. S. continued their "following the footsteps of Europe" but quickly began to accept the things proven by Europe and started showing some of their own engineering initiative.

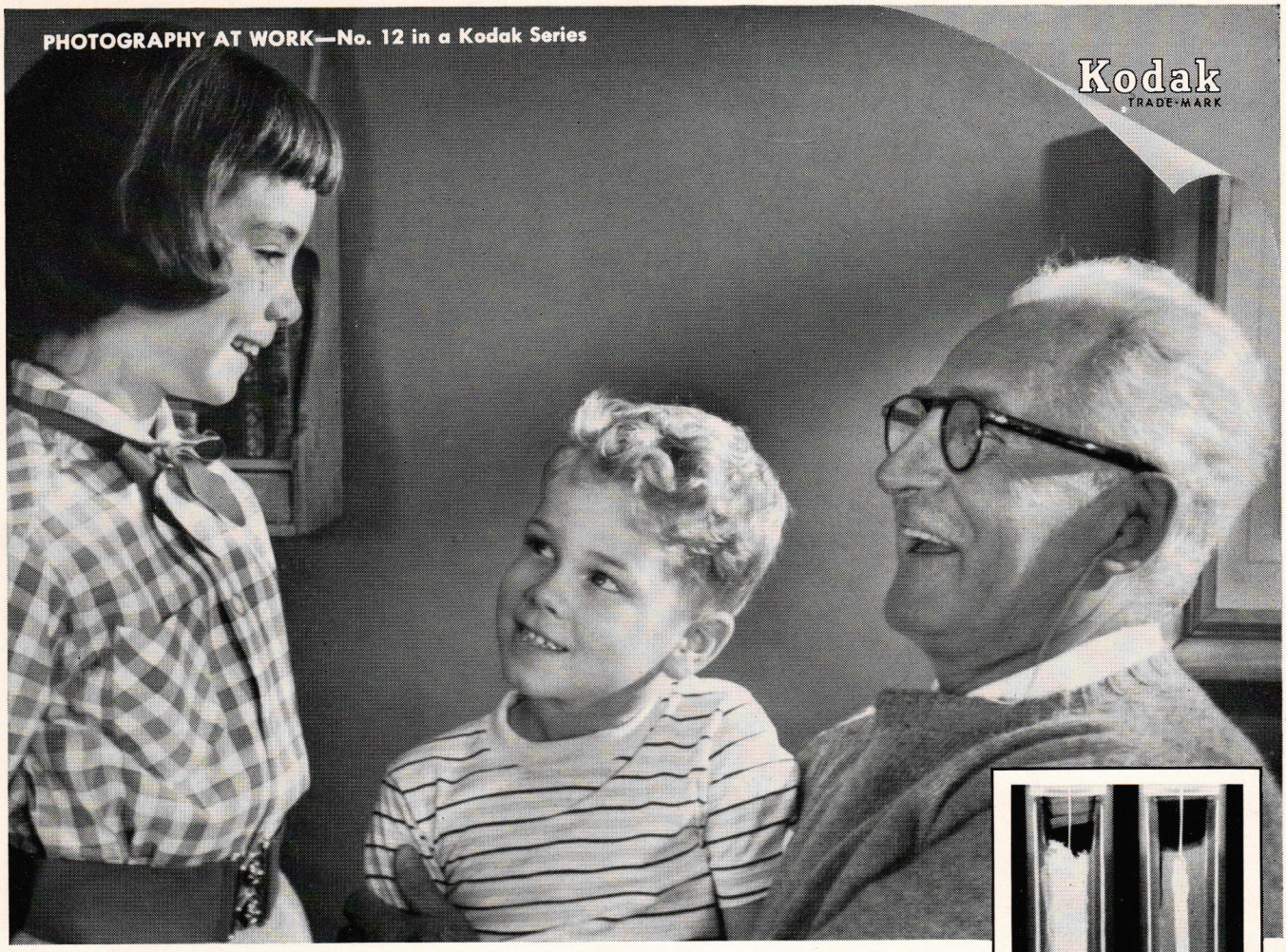
Maxwell M. Upson, of the Raymond Concrete Pile Co., of New York, remarked in his article on prestressed concrete: "From the beginning all of us who have built with reinforced concrete have been conscious of its serious drawbacks. Steel and concrete differ so markedly in physical characteristics . . . that it has been difficult heretofore to work them into a homogeneous whole. To the fraternity of engineers who have long dealt in concrete, prestressing is the answer to a fervent and oft-repeated prayer. The dream of a homogeneous concrete with real tensile strength has come true."

But let us avoid the assumption that prestressed concrete is a mature building tool, that it needs no improvement, lest we be disillusioned later on. To all intents and purposes we have advanced as far as Europe, but alas, Europe's advancement in this field still leaves much to be desired. Let those of us who intend working with concrete after graduation realize now the frailties and uncertainties that are still involved in the use of prestressed concrete and endeavor to make it what its potential indicates it to be—the most useful building material discovered in this country.

IN OUR NEXT ISSUE

THE VACATION ***is almost here and finals will soon be upon us, so the*** **MECHELECIV** ***staff will take a break from the publication business and concentrate on passing a few courses this semester. The next issue of the*** **MECHELECIV** ***will be out in March, and we have many interesting features to spring on our readers. Below is a description of one of the feature articles.***

BERNIE GOODRICH, ***Commodore of the Sailing Team, will tell us about the activities of the only varsity sport (other than basketball) in which G.W. consistently takes top honors in National Competitions. An interesting point about the Sailing Team here is that in the last few years they have beaten the Naval Academy at their own game by winning every Annapolis-GW meet.***



When photography peered inside... the battery shrank in size...lasted longer

Radiograph showing how anode grows in use. From such facts, National Carbon developed a battery with the largest possible anode in a small case.

In air-depolarized hearing-aid batteries, anode size determines battery life. But anodes swell in use. How big could one be for a tiny new case? National Carbon Company used x-rays and photography and found out.

NEW electronic developments were making hearing aids more effective, smaller, more convenient. What was needed was a power supply equally advantageous. Could this be had without sacrifice in battery life?

National Carbon Company thought so—put x-ray photography to work—and came up with a mighty midget "Eveready" with unusually long life.

Checking internal conditions like this—proving the soundness of castings and welds—inspecting the inside of "sealed-in" assemblies—are all in the day's work for photography.

In fact, graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning serviceman, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Eastman Kodak Company, Rochester 4, N. Y.

Looking ahead with General Electric

How do you measure up in leadership qualities?

A young man who can lead has always had a good chance of success, but his prospects were never better than now. There's a steadily growing demand in industry for men to fill top professional and management jobs . . . fellows with a special ability to work well with other people and inspire their best work. At General Electric, we're constantly on the lookout for them.

Ten traits we look for, above, add up to a pretty good indication of potential success in business. Not everyone has them all to a top degree, but the basic characteristics are always present and can be developed in the men we pick to help lead General Electric. We hope you can rate yourself very high on the list and find it helpful.

EDUCATIONAL RELATIONS, GENERAL ELECTRIC CO., SCHENECTADY, N. Y.

DID YOU KNOW? Opportunities for G-E leadership jobs are expected to double in the next 10 years. The need: technical and non-technical professionals and managers.

Progress Is Our Most Important Product

GENERAL ELECTRIC